Transforming a Conventional Financial Statement into a Shariah Compliant One

Dr. Tono Saksono
Associate Professor, Faculty of Civil and Environmental Engineering, University Tun Hussein Onn Malaysia (UTHM), Johor, Malaysia. Phone: +607-456-4351; Email: tsaksono@uthm.edu.my.

Abstract
The use of the Gregorian calendar as the basis of Islamic Finance has created inadvertent embezzlement of zakat payment. That is because the Gregorian calendar is 11.5 days longer than the Islamic calendar. This flawed accounting system has caused a Muslim’s business to underpay the corresponding zakat, which is accumulating into one year for every thirty year of its business operation. This study does not only calculate the zakat payment loss due to the use of the Gregorian calendar in a Muslim business operation, it also calculates the accuracy of the estimate. Lastly, the study proposes a swift way of transforming a conventional financial system to the one that is compliant with shariah principles, at a low cost.

1 Introduction
Madslien [1] reveals an amazing fact that the total debts of the world’s poorest countries has hiked astronomically from mere $25 billion to $523 billion only in 32 years from 1970 to 2002. Economists call it as a debt-trap that actually has caused the economy of the poorest countries becomes even more uncontrollable. In return, this has further escalated the poverty level of the indebted countries. Later in 2008, the World Bank released the poverty level data at a poverty line of $1.25 a day [2]. With this benchmark, WB estimates that some 1.4 billion people actually live at this poverty line or below. In addition, the estimated number of poor was 1.9 billion in 1981 alone. These are alarming facts about a continuing escalation of poverty in our blue planet. In anticipating this, almost 200 UN member countries which were then supported by 23 international organizations signed the UN’s Millennium Declaration in 2000. They set up common goals the so-called the Millennium Development Goals (MDGs). Their objectives include, among others [3]:

a) Eradicating extreme poverty and hunger, and
b) Achieving universal primary education, especially in the third world countries that suffer most from this unjust world’s wealth distribution.

Shah [4] further emphasizes that the causes of debt in the third world countries are in general:

a) Unjust debts transfer from the colonizing regime to the developing countries as the legacy of past colonialism;

b) The unjust odious debt incurred by the developing countries as a legacy of previous corrupt regime.

Within the Muslim’s world, the legacy of inequalities of the wealth distribution as a result of past colonization are still enormous as shown in their current GDP per capita of Muslims’ world [5, 6] and are classified as HIPC (Heavily Indebted Poor Countries) with GDP per capita less than US$ 2,000. The total population of these HIP countries is close to 270 million [6]. Unfortunately, the loan scheme to these poorest countries does not comply with Islamic principles because the majority of donor institutions come from western world. Furthermore, the existing loan scheme from these donor institutions seems to have failed to meet MDG programs. Muslims are therefore obliged to seek other funding sources for poverty eradication within Muslims world. This study investigates and addresses one of them.

2 What can Muslims contribute?
Muslims actually reserves a huge potential of power for eliminating poverty especially in Muslim countries through zakat collection. Not only for the future collection, but also if Muslims are willing to rectify their past mistakes due to wrong conception in applying wrong financial system. The scope of this study emphasizes on the latter issue.

Saksono [7-9] has shown that due to the inexistence of a reliable Islamic calendar, Muslim’s businesses have used the Gregorian calendar as the basis of their accounting system. In so doing, Muslims actually have applied a flawed Islamic financial system because the Gregorian calendar is about 11.5 days longer than the Islamic calendar. Although the use of the Gregorian calendar has
ensured a full conformity of the Islamic economics with the western economics system, it actually preserves long-term problems. An Islamic business entity that closes its annual balance sheet and income statements on December 31, it should have paid the zakat of the booked profit and distributed dividends to its stakeholders 11.5 days earlier according to the Islamic shariah. Otherwise, it creates 11.5 days unpaid zakat, and it accumulates into one year unpaid zakat for thirty year operation of the business. Taking into account that all Muslims’ businesses have committed to apply this flawed system for hundreds of years, the magnitude of the embezzled zakat must be unimaginably huge.

In order to prove this hypothesis, Saksono developed the algorithm for the calculation this zakat payment deficit through several approaches. The process is diagrammatically shown in Figure 3.

Figure 3: Transformation from a conventional to a shariah compliant financial statement
The methodology essentially consists of three basic approaches:

a) To conduct a robust astronomical transformation from the sun-based (Gregorian) into the lunar-based (Islamic) calendar systems in order to develop an accurate Islamic calendar;

b) To develop a robust transformation algorithm for a highly stochastic economic data with which the astronomical benchmark can be applied;

c) To apply a versatile error analysis and proposed appropriate remedies in order to improve the reliability of the estimate.

2.1 Gregorian to Islamic calendar transformation
The transformation from the Gregorian (i.e. solar) to the Islamic (i.e. lunar) calendar systems essentially is a mathematical transformation involving three different spatial coordinate systems i.e. ecliptic, horizon, and equatorial coordinate systems. These three coordinate systems are constructed when all celestial bodies (e.g. $O$ in Figure 3, see [10]) are projected onto a virtual celestial sphere having a radius of infinity with the earth as the center of their apparent movement of $O$. The ecliptic coordinate system is a coordinate system whereby the apparent sun is rotating the earth, due to the revolution of the earth over the sun. In addition, we also need to understand the relationship between the ecliptic coordinate system with the equatorial coordinate systems because the earth is also rotating along its axis. This axis is perpendicular to equatorial plane. Unfortunately, the equatorial plane is not parallel with the ecliptic plane; therefore we have to take into account its obliquity.
Lastly, we should also be able to relate these two coordinate systems with the horizon coordinate system because we are actually standing perpendicular to the horizon plane during our observation. Through this mathematical relationship, we are able to locate the position of the moon and the sun, and to calculate the birth moment of crescent that marks the beginning of an Islamic month. This is actually the basic prerequisite of the development of the Islamic calendar. Of course, different interpretation of the sources of Islamic law contained in the Qur’an and Hadith (prophetic sayings) all blended into a complication, which further creates that the development of the Islamic calendar stands still in the middle of nowhere up to the present time. The process is too technical to address in this paper because this is actually a blending complication of Islamic law, science and engineering problems. Interested readers are referred to [10, 11].

**Figure 4: Equatorial and Horizon coordinate systems**

Where:

<table>
<thead>
<tr>
<th>NCP:</th>
<th>North Celestial Pole, which is the intersection between the extended rotation axis of the earth with the celestial sphere;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zenith:</td>
<td>The intersection of the extended observer’s local vertical with the celestial sphere;</td>
</tr>
<tr>
<td>O:</td>
<td>The celestial body of interest (e.g. the sun or the moon);</td>
</tr>
<tr>
<td>A:</td>
<td>Azimuth</td>
</tr>
<tr>
<td>ϕ:</td>
<td>Latitude of the observer on the earth’s surface;</td>
</tr>
<tr>
<td>h:</td>
<td>Altitude of O with respect to the horizon;</td>
</tr>
<tr>
<td>δ:</td>
<td>Declination of O with respect to the equatorial plane</td>
</tr>
<tr>
<td>τ:</td>
<td>Hour angle</td>
</tr>
</tbody>
</table>

In a Cartesian coordinate system, the relationship between the ecliptic coordinates \((x, y, z)\) and the equatorial coordinates \((x', y', z')\) is given in [10] (see p. 17):

\[
\begin{align*}
x' &= +x \\
y' &= +y \cos \varepsilon - z \sin \varepsilon \\
z' &= +y \sin \varepsilon + z \cos \varepsilon
\end{align*}
\] (1)

Where:

\[\varepsilon = 23^\circ.43929111 - 46^\circ.81507T - 0^\circ.000597T^2 + 0^\circ.0018137T^3\]

\[T = (JD - 2451545)/3625\]

\[JD = Julian Date, or the total number of days that have elapsed since 1 January 4713 BC.\]
To calculate the azimuth and altitude of a celestial body from its known hour angle and declination is given in Equation (2) [10] p. 37:

\[
\begin{align*}
\cos h \cos A &= + \cos \delta \cos \tau \sin \phi - \sin \delta \cos \phi \\
\cos h \sin A &= + \cos \delta \sin \tau \\
\sin h &= + \cos \delta \cos \tau \cos \phi + \sin \delta \sin \phi
\end{align*}
\] (2)

Conversely, the hour angle and declination can be computed from Equation (3) [10]:

\[
\begin{align*}
\cos \delta \cos \tau &= + \cos h \cos A \sin \phi - \sin h \cos \phi \\
\cos \delta \sin \tau &= + \cos h \sin A \\
\sin \delta &= - \cos h \cos A \cos \phi + \sin h \sin \phi
\end{align*}
\] (3)

### 2.2 Econometric model transformation

Although business management target, social unrest, political intervention, and other factors might strongly affect the economy, economic data in general always retain its stochastic characteristics. Saksono [7-9] has shown that a popular linear regression is actually insufficient in modeling a highly volatile economic data. Instead, he proposed the use a more versatile mathematical model that is very popular in engineering applications, namely a higher degree polynomial.

\[
\begin{align*}
y_i &= p_0 + p_1 x_i + p_2 x_i^2 + p_3 x_i^3 + \ldots + p_n x_i^n \\
\hat{x} &= (A^tA)^{-1}A^t l = N^{-1} A^t l \\
\nu &= \{A(A^tA)^{-1}A^t - I\} l = \{AN^{-1}A^t - I\} l
\end{align*}
\] (4-6)

Where:

- \( y_i \): Stock price at the \( i \)th day, or PLBZ (profit-loss before zakat) data;
- \( x_i \): \( i \)th transaction day, or the official date of financial statement is released;
- \( p_0, p_1, \ldots, p_10 \): Unknown parameters of the polynomial to be determined;
- \( \hat{x} \): Unknown parameter matrix;
- \( A \): Design or coefficient matrix;
- \( A^t \): Transpose matrix of \( A \);
- \( N \): Multiplication of matrices of \( A^tA \);
- \( N^{-1} \): Inverse of \( N \) matrix;
- \( l \): Identity matrix;
- \( \nu \): Vector of residual error;
- \( l \): Vector consisting of \( y_i \) in a predetermined window.

Understanding the statistical characteristics of the above variables and parameters are of primary importance in order to improve the reliability of the estimate. Under Null Hypothesis \( H_0 \), the distribution of \( l, \hat{x} \) and \( \nu \) is written [12-15]:

\[
\begin{align*}
l &\sim N(Ax, \sigma_0^2) \\
\hat{x} &\sim N(x, \sigma_0^2Q_{xx}) \\
\nu &\sim N(0, \sigma_0^2Q_{vv})
\end{align*}
\] (7-9)

Based on these statistical characteristics, two scenarios are applied in order to obtained the best accuracy of the modeling, namely statistical and geometric remedies [7].

### 3 Results

The above algorithms were then applied for two sets of economic data that represent the real problem in calculating the potential zakat payment deficits in Muslim’s mundane lives. The first data was a simulated collective ownership of paper assets of world class enterprises and favorite tradable goods for long-term investment that can be obtained from stock market.
Table 5 shows a collective ownership of five paper assets by Muslims in the world [7]. They include the possession a number of shares of General Electric, gold, silver, crude oil and copper. The asset volumes, the period of the ownership, and the total zakat payment loss due to wrong definition of the financial system are shown in the table. The table demonstrates that, even for the ownership of only five paper assets and the period of ownership of less than twenty years, Muslims have inadvertently embezzled zakat payment of about US$ 9.2 million when they used a flawed Islamic finance that is based on the Gregorian calendar. The embezzled zakat must be unimaginably huge when one takes into account the total Muslims’ assets for a longer ownership period. One should bear in mind that the algorithm has been able to obtain a high relative accuracy of 1.3% (average) of the stock price. Therefore, for a stock price of US$ 1 per share, for example, the relative error is only about US$ 1.3 cents. Higher accuracy results in Table 5 were obtained by applying the abovementioned statistical and geometric remedies.

Table 5: Zakat payment deficit for the possession of five different paper assets

<table>
<thead>
<tr>
<th>ASSETS</th>
<th>VOLUME</th>
<th>PERIOD (From To)</th>
<th>ZAKAT (Greg. US$)</th>
<th>ZAKAT (Islamic US$)</th>
<th>Zakat deficit (US$)</th>
<th>Relative Accuracy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Electric</td>
<td>10 million shares</td>
<td>5/1/2000 - 16/6/2009</td>
<td>81,583,329</td>
<td>83,968,940</td>
<td>2,385,611</td>
<td>1.69</td>
</tr>
<tr>
<td>Gold</td>
<td>1,000,000 ounces</td>
<td>2/1/1990 - 5/6/2009</td>
<td>206,622,239</td>
<td>212,048,171</td>
<td>5,425,932</td>
<td>0.28</td>
</tr>
<tr>
<td>Silver</td>
<td>1,000,000 ounces</td>
<td>1/8/1996 - 26/5/2009</td>
<td>3,537,163</td>
<td>3,643,871</td>
<td>106,708</td>
<td>1.25</td>
</tr>
<tr>
<td>Crude oil</td>
<td>10 million barrels</td>
<td>16/8/2006 - 24/2/2011</td>
<td>41,781,151</td>
<td>42,970,881</td>
<td>1,189,730</td>
<td>1.38</td>
</tr>
<tr>
<td>Copper</td>
<td>10 million units</td>
<td>10/7/1995 - 7/6/2011</td>
<td>7,403,671</td>
<td>7,478,343</td>
<td>74,671</td>
<td>1.71</td>
</tr>
</tbody>
</table>

**TOTAL ZAKAT DEFICIT: US$ 9,182,652**

The second case used the financial statements data. Unfortunately however, the financial statements used have two significant drawbacks, namely:

a) The financial statements of Islamic banks are not available in public domain. An attempt to obtain such data from several banks was unsuccessful. Such data might be considered as classified in spite of the fact that the banks actually have been listed in the available shariah stock market;

b) In order to test the accuracy of the algorithm therefore, financial statements of two world reputable companies, Google and Microsoft, were used. However, again, the available datasets in public domain were not ideal because they are only quarterly financial statements. Higher resolution data (e.g. monthly financial statements) are not available.

Under the aforementioned constraints, the algorithms were applied to the available datasets. The results are given in Table 6 [9]. Albeit rather low relative accuracy (see column 7), the table further demonstrates the potential of zakat payment loss when Muslims use a flawed financial statements. Should Google be a Muslim’s enterprise, it should have embezzled almost US$ 10 million of zakat during its business operation from 2003 to 2012 alone. Likewise, Microsoft also has underpaid its obligation to pay zakat of almost US$ 81 million for 15 years of its business operation, if it were a Muslim’s enterprise.

Proposed statistical and geometric remedies did not improve much the results in Table 6. However, that was mainly due to low resolution of the data available. Should a higher resolution data available, the theoretical accuracy in column 7 will improve accordingly. Meaning to say, if monthly financial statements are available, it is of firm confidence that the relative accuracy of 3%-4% can be obtained.

Table 6: Zakat payment deficit based on quarterly financial statements

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>FROM - TO PERIOD (year)</th>
<th>ZAKAT (Greg. Cal.) (US$ million)</th>
<th>ZAKAT (Islamic Cal.) (US$ million)</th>
<th>Zakat deficit (US$ million)</th>
<th>Average Relative Accuracy</th>
</tr>
</thead>
</table>

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4 Aggregate of Muslims’ assets

Although the results shown in Table 5 and Table 6 only used limited commodities, the amount of zakat deficit is quite alarming viewed from shariah (Islamic law) standpoint. The results hence have demonstrated that Muslims’ mundane lives actually have spiritual consequences, unlike what majority of Muslims scholars thought before. A more comprehensive research is required in order to estimate the actual total zakat deficit due to the flawed practice of the Islamic economy along Muslims’ civilization. If Muslims are also able to construct a proper infrastructure for the global strategic repayment schemes, we actually reserve a huge potential power to eradicate poverty without being dependent on financial aids of the western world.

One should bear in mind also that, apart from the limited number of commodities used in the above study, they are not real data. The main purpose of using them is just for algorithmic development in an academic research. However, the potential loss of the zakat payment in Muslims’ real life must be quite alarming, and it is real. One should recall that the total amount of the inadvertently embezzled zakat is actually a function of two important variables namely, the aggregated Muslims’ assets and the period Muslims have been practicing the flawed financial system.

Ernst & Young in its report in 2012 is quoted as saying “One potential scenario shows global Islamic banking assets with commercial banks to reach $1.8 trillion in 2013 (2011: $1.3 trillion), representing average annual growth of 17%” [11]. The report further disclosed this fact and is quoted herewith “Islamic banking growth outlook continues to be positive, growing 50% faster than overall banking sector in several core markets. In Saudi Arabia, market share of Islamic banking assets is now over 50%”. Ambitious UK to lead the global market for Islamic financial services is also sparked by the fact that the steady growth of shariah compliant assets. It is estimated to reach US$ 2 trillion by the end of 2014 [10].

In the mean time however, sample series of financial statements of Islamic banks in the world are still using the Gregorian calendar as the basis of their financial system [16-30]. It is of firm belief therefore that all Islamic banks in the world are actually practicing the flawed shariah financial system.

These two variables (i.e. huge assets and long period of applying a flawed financial system) therefore confirm the huge potential of zakat payment loss. It continuous to grow unstoppably and it becomes Muslims’ civilization debt. All Muslims should be warned that zakat in Islam is meant not only to cleanse one’s wealth, but more importantly to purify his/her soul [31]. From shariah standpoint, therefore, it is imperative that all Muslims in the world seek a strategic way for the repayment scheme in one way or the other. This attempt, on the other hand, will generate an unimaginably huge financial resources preserved by Muslim’s world in the development of global economy, especially in poverty eradication program in the third world countries.

Therefore, it is extremely urgent for Muslims all over the world to undertake the following steps:

1. Muslims should seek ways of stopping the “bleeding” by immediately stop the use of the Gregorian calendar and apply the Islamic calendar for their business and all aspects of their worldly lives. Failure in so doing will make the Muslims’ civilization debt keeps growing bigger and bigger unstoppably.
2. All Muslims in the world should accept the pure astronomical calculation as the sole basis for the construction of the Islamic calendar; without which, the Islamic calendar will never exist, and we will not be able to stop the abovementioned bleeding.
3. Muslims scientists must construct a strategic global alliance to estimate the total zakat payment deficit due to the flawed practice of shariah economy so far.
4. Only then, Muslims will find ways of repayment scheme for their unconscious civilization debt.

5 Transforming the current financial statement into a shariah compliant one

Apart from the above long-term target however, it is of paramount importance to propose a method in transforming the current (i.e. conventional) financial statements of Islamic banks into a shariah compliant one.

An Islamic bank of course has options. First, it can go to a financial consultant to redo all the financial statements in order to comply with a genuine Islamic financial system that is based on the Islamic calendar. This is a conventional way of transforming the conventional financial statement to comply with the shariah principles. Considering that the bank has been operating for forty years or so, and the consultant has to recalculate the whole financial system on a monthly basis, the conversion might cost a great deal, besides it will take long time to accomplish. Therefore, unless there is a simple and low cost method in transforming the existing financial system, Islamic banks are very likely reluctant to swiftly undertake the migration. In the meantime, reluctance in swiftly performing the migration to the correct system, or any delay in so doing obviously will generate the deficit of the zakat payment is further stacking up.

This study proposes a simple, robust, and low cost solution for the migration from a conventional financial statement in order to comply with the shariah principles. The procedure is diagrammatically revealed in Figure 3. The methodology and the algorithm are given in the following sections, whilst the results are given in Section 3. Furthermore, this study proves that the proposed method is workable and can achieve high standard of accuracy. Estimated zakat payment deficit revealed in Table 5 and Table 6 demonstrated this claim. It is of firm confidence that this is something that has been forgotten not only by Muslim scholars, but also by Muslim economists. The proposed system is not only able to transform a flawed financial statement into a shariah compliant one, but it also calculates the zakat payment deficit along the business operation of a Muslim enterprise. It works faster at a very low cost compared with the conventional way.

6 Conclusions

This study has demonstrated that the current practice of our shariah economy is substantially flawed, as it is using the Gregorian calendar as the basis of its accounting system. This is what so called pseudo-shariah economy system. It is rather unproductive when Muslims develop shariah economy as an effort to be free from prohibited activities and elements in business (riba, maysir, and gharar) on the one hand, but they are nurturing a system that facilitates zakat embezzlement on the other hand. Therefore, Muslims all over the world should be able to undergo major reform in their business practice by using the Islamic calendar as the basis of their accounting system. Otherwise, the zakat deficit will be snowballing unstoppably, and it will be burdened by the next generations of Muslims.

A more comprehensive research is required in order to estimate the actual total zakat deficit due to the flawed practice of the Islamic economy along Muslims’ civilization. If Muslims are also able to construct a proper infrastructure for the global strategic repayment schemes, we actually reserve a huge potential power to eradicate poverty without being dependent on financial aids of the western world. The followings are going to be the future objectives of the next research that will emphasize in scrutinizing:

1. The period whereby Muslims have been neglecting the Islamic calendar as the basis of their accounting system in business;
2. The strategic sampling of commodities representing the total assets of all Muslims’ business;
3. The total zakat payment deficit when the real profit/loss data of Muslim’s business financial statements are used.

Upon the completeness of the long-term research objective, we will then be able to declare the most probable value of Muslims’ civilization debt accumulated due to the flawed Islamic economy system.

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